SECTION 02770

GEOMEMBRANE LINER AND CAP

PART 1 GENERAL

1.01 SCOPE

A. The Section includes geomembrane liner and cap products furnished by Fluor Daniel Fernald (FDF) and installed by the Contractor for the cell liner system and cell final cover system, respectively

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02215 - Trenching and Backfilling

C. Section 13005 - Liner Penetration Boxes

D. Part 8 - Environmental Health and Safety, and Training Requirements

E. Part 9 - Quality Assurance Requirements

1.03 REFERENCES

A. Latest version of the American Society for Testing and Materials (ASTM) standards:
   1. ASTM D 638. Standard Test Method for Tensile Properties of Plastics.
   2. ASTM D 746. Standard Test Method for Brittleness, Temperature of Plastics and Elastomers by Impact.
   3. ASTM D 792. Standard Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
   4. ASTM D 1004. Standard Test Method of Initial Tear Resistance of Plastic Film and Sheeting.
   5. ASTM D 1204. Standard Plastics Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
   6. ASTM D 1238. Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

7. ASTM D 1505. Standard Test Methods for Density of Plastics by Density-Gradient Technique.
8. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.
9. ASTM D 4437. Standard Test Methods for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Geomembranes.
10. ASTM D 5397. Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
11. ASTM D 5596. Recommended Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.

B. Latest version of the Geosynthetic Research Institute (GRI) test procedures:
1. GM8 Standard Test Method for Measurement of the Core Thickness of Textured Geomembrane.

C. Latest version of National Sanitation Foundation (NSF) 54, Flexible Membrane Liners, Annex A.

1.04 SUBMITTALS

A. Submit to Construction Manager for review as part of Bid a copy of Installer's letter of approval or license by the geomembrane Manufacturer.

B. Submit to the Construction Manager for review the following information from the Installer at least 14 calendar days prior to mobilization of the Installer to the site.
1. Layout drawings showing the installation layout identifying geomembrane panel configurations, dimensions, details, locations of seams, as well as any variance or additional details which deviate from the Construction Drawings. The layout drawings shall be adequate for use as a construction plan and shall include dimensions, details, etc. The layout drawings, as modified and/or approved by the Construction Manager, shall become part of the Contract.
2. Installation schedule.
3. Installation capabilities, including:
   a. information on equipment proposed for this project;
   b. average daily production anticipated for this project; and
   c. quality control procedures to include quality control organization.
4. A list of at least 10 completed facilities for which the Installer has installed a minimum of 10,000,000 square feet of polyethylene geomembrane. Alternate qualifications may be evaluated by the Construction Manager on a case by case basis. The following information shall be provided for each facility:

a. the name and purpose of the facility, its location, and dates of installation;
b. the names of the owner, project manager, and geomembrane manufacturer;
c. name and qualifications of the supervisor of the installation crew;
d. thickness and surface area of installed geomembrane;
e. type of seaming and type of seaming apparatus used; and
f. duration of installation.

5. Resumes of the Installer Superintendent and quality control chief to be assigned to this project, including dates and duration of employment.
6. Resumes of all personnel who will perform seaming operations on this project, including dates and duration of employment.
7. Evidence that the installation crew has the following experience.
   a. The Superintendent shall have supervised the installation of a minimum of 5,000,000 square feet of polyethylene geomembrane.
   b. At least one seamer shall have experience seaming a minimum of 1,000,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Seamers with such experience will be designated "master seamers" and shall provide direct supervision over less experienced seamers.
   c. All other seaming personnel shall have seamed at least 100,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Personnel who have seamed less than 100,000 square feet of seams shall be allowed to seam only under the direct supervision of the master seamer or Superintendent.
8. Geomembrane deployment and seaming methods for cold (<40 F) or hot (>104 F) weather.

C. Submit to the Construction Manager for review at least 14 days prior to geomembrane placement, a Certificate of Calibration less than 12 months old for the field tensiometer. Tensiometer shall be calibrated within one year of date of test. Calibration shall be traceable to national or industry recognized standards where possible.

D. Submit to the Construction Manager for review at least 14 days prior to geomembrane placement, a Certificate of Calibration less than 12 months old for gauges used for vacuum testing and pressure testing geomembrane seams. Gauges shall be calibrated within one year of date of test. Calibration shall be traceable to national or industry recognized standards where possible.

E. Submit subgrade acceptance certificates, signed by the Installer, for each area to be covered by the geomembrane prior to that area being covered by geomembrane.

1.05 HEALTH AND SAFETY REQUIREMENTS

A. Environmental, health and safety, and other training requirements shall be as specified in Part 8 of the Contract Documents.

PART 2 PRODUCTS

2.01 FDF FURNISHED GEOMEMBRANE PRODUCTS

A. FDF will furnish geomembrane products meeting the requirements as specified.

2.02 RESIN

A. Geomembrane will be manufactured from new, first-quality polyethylene resin. No reclaimed polymer will be added to the resin. The use of polymer recycled during the manufacturing process is permitted if performed with appropriate cleanliness and if the recycled polymer during the manufacturing process does not exceed 2 percent by weight of the total polymer weight.

B. High density polyethylene (HDPE) resin will have the following properties:
   1. Specific Gravity: 0.935 minimum (ASTM D 792 Method A, or ASTM D 1505)
   2. Melt Flow Index: 1.0 g/10 min., maximum (ASTM D 1238 Condition E)

2.03 GEOMEMBRANE PROPERTIES

A. HDPE textured geomembrane will have properties that comply with the required values shown in Table 02770-1.

B. In addition, geomembrane will:
   1. contain a maximum of 1 percent by weight of additives, fillers, or extenders not including carbon black; and
   2. not have striations, pinholes, bubbles, blisters, nodules, undispersed raw materials, or any sign of contamination by foreign matter on the surface or in the interior.

2.04 LABELING

A. Each geomembrane roll furnished by FDF will be labeled with the following information.
   1. thickness of the material;
   2. length and width of the roll;
   3. name of Manufacturer;
   4. product identification;
   5. lot number; and
   6. roll number.

B. Geomembrane rolls not labeled in accordance with this Section or on which labels are illegible will be rejected and replaced. Contractor shall notify the Construction Manager of any missing or illegible labels and shall protect labels until rolls are incorporated into the cell.

2.05 ACCEPTANCE, HANDLING, AND STORAGE

A. Within 45 days of Authorization to Mobilize, Contractor shall inspect and inventory the geomembrane material and the manner in which it is stored. Contractor shall provide a written letter of acceptance within 45 days to the Construction Manager if material is acceptable for installation. Contractor shall also notify the Construction Manager in writing within 45 days of any geomembrane material not acceptable for installation.

B. Maintain a program for protection and preservation of geomembrane to include but not limited to:
   1. proper handling and storage of the geomembrane at the site;
   2. protection of the geomembrane from excessive heat or cold, dirt, puncture, cutting, or other damaging or deleterious conditions; and
   3 geomembrane storage on palates or other elevated structures off the ground surface and not more than 3 rolls high.

PART 3 EXECUTION

3.01 GEOMEMBRANE DEPLOYMENT

A. General:
   1. Do not deploy geomembrane until the layout drawings are approved by the Construction Manager.

2. Do not deploy a geomembrane panel in an area until the Construction Manager has been provided with a certificate of subgrade acceptance for that area.
3. Do not deploy geomembranes until CQC Consultant completes conformance evaluation of the geomembrane and performance evaluation of previous work, including evaluation of Contractor's survey results for previous work.
4. Deploy each geomembrane panel in accordance with the approved layout drawings.

B. Field Panel Identification:
1. Give each field panel an identification code (number or letter-number). This identification code shall be agreed upon by the CQC Consultant and the Installer.
2. A geomembrane field panel is a roll or a portion of roll cut in the field.

C. Field Panel Placement:
1. Place one geomembrane panel at a time and seam each panel immediately after its placement.
2. Use temporary rubsheets as required to prevent displacement or damage to underlying geosynthetics. High spots in geomembrane-backed geosynthetic clay liners shall be covered by a temporary rubsheets during placement of geomembrane.
3. Do not place geomembrane panels when the ambient temperature is below 40 Fahrenheit (F), unless authorized in writing by the Construction Manager. For cold weather (<40 F) deployment, use the additional procedures authorized in writing by the Construction Manager.
4. Do not place geomembrane in areas of ponded water or in the presence of high wind which make geomembrane deployment unsafe.
5. Ensure that:
   a. No vehicular traffic drives directly on the geomembrane.
   b. Equipment used does not damage the geomembrane by handling, trafficking, or leakage of hydrocarbons (i.e., fuels).
   c. Personnel working on the geomembrane do not smoke, bring glass onto the geomembrane, or engage in other activities that could damage the geomembrane.
   d. The method used to unroll the panels does not scratch or crimp the geomembrane and does not damage lower geosynthetics or the supporting soil.
   e. The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels). The method used to place the panels results in intimate contact with geosynthetic clay liner. Adjust or repair any area of geomembrane wrinkles where the wrinkle height, measured perpendicular to the slope during the hottest portion of the day, is more than 4 inches.
   f. The method used to place the panels does not cause the panels to lift up or trampoline during the coolest portion of the day.

g. The geomembrane is anchored or weighted with sandbags, or the equivalent, to prevent damage or uplift from wind. Install sufficient anchoring or weighting to prevent uplift and maintain such system until overlying material is placed.

6. Replace any field panel or portion thereof that becomes damaged (torn, twisted, or crimped). Remove damaged panels or portions of damaged panels from the work area.

D. Do not install geomembrane between one hour before sunset and one hour after sunrise unless approved by the Construction Manager.

3.02 FIELD SEAMING

A. Personnel shall be experienced as specified in this Section. Do not perform seaming unless a "master seamer" and the CQC Consultant is on-site.

B. Orient seams parallel to the line of maximum slope (i.e., oriented down, not across, the slope). Minimize the number of seams in corners and at odd-shaped geometric locations. No horizontal seam shall be less than 10 feet from the toe of the slope, except where approved by the Construction Manager. Do not locate seams at an area of potential stress concentration.

C. Weather Conditions for Seaming:
1. Do not seam geomembrane at ambient temperatures below 40 F or above 104 F, unless authorized by the Construction Manager.
2. Measure ambient temperatures between 0 to 6 inches above the geomembrane surface.
3. In all cases, the geomembrane seam areas shall be dry and protected from wind.

D. Overlapping and Temporary Bonding:
1. Sufficiently overlap geomembrane panels for welding and to allow peel tests to be performed on the seam as specified in this Section. Any seams that cannot be destructively tested because of insufficient overlap are failing seams.
2. Control the temperature of the air at the nozzle of heat bonding apparatus such that the geomembrane is not damaged.

E. Seam Preparation:
1. Prior to seaming, clean the seam area and ensure that area to be bonded is free of moisture, dust, dirt, debris of any kind, and foreign material.
2. If seam overlap grinding is required, complete the process according to the Manufacturer's instructions within 20 minutes of the seaming operation. Do not

grind to a depth that exceeds ten percent of the geomembrane thickness. Grinding marks shall not appear beyond 0.25 inch of the extrudate after it is placed.

3. Align seams with the fewest possible number of wrinkles and "fishmouths".

F. General Seaming Requirements:
   1. Extend seams to the outside edge of panels to be placed in the anchor trench.
   2. If required, place a firm substrate such as a flat board or similar hard surface directly under the seam overlap to achieve proper support.
   3. Cut fishmouths or wrinkles at the seam overlaps along the ridge of the wrinkle to achieve a flat overlap. Seam the cut fishmouths or wrinkles and patch any portion where the resulting overlap is less than 6 inches with an oval or round patch of geomembrane that extends a minimum of 6 inches beyond the cut in all directions.
   4. Place the electric generator used for power supply to the welding machines outside the area to be lined or mount it on soft tires such that no damage occurs to the geomembrane. Properly ground the electric generator. Place a smooth insulating plate or fabric beneath the hot welding apparatus after use.

G. Seaming Process:
   1. Approved processes for field seaming are extrusion welding and fusion welding. Use only geomembrane Manufacturer-approved equipment.
   2. Extrusion Equipment and Procedures:
      a. Maintain at least one spare operable seaming apparatus on site.
      b. Equip extrusion welding apparatus with gauges giving the temperature in the apparatus and at the nozzle.
      c. Prior to beginning a seam, purge the extruder until all heat-degraded extrudate has been removed from the barrel. Whenever the extruder is stopped, purge the barrel of all heat-degraded extrudate.
   3. Fusion Equipment and Procedures:
      a. Maintain at least one spare operable seaming apparatus on site.
      b. Fusion-welding apparatus shall be automated self-propelled devices equipped with gauges giving the applicable temperatures and travel speed.
      c. Fusion-welding apparatus shall produce a double-track seam.
      d. Abrade the edges of cross seams to a smooth incline (top and bottom) prior to extrusion welding.

H. Trial Seams:
   1. Make trial seams on excess pieces of geomembrane to verify that seaming conditions are adequate. Conduct trial seams on the same material to be installed and under similar field conditions as production seams. Conduct trial seaming at the beginning of each seaming period, and at least once each five hours, for each seaming apparatus

used that day prior to seaming. Also, each seamer shall make at least one trial seam each day, for each day that seaming is performed by that seamer. Conduct trial seaming under the same conditions as the actual seaming. Prepare trial seams that are at least 15 feet long by 1 foot wide (after seaming) with the seam centered lengthwise for fusion equipment and at least 3 feet long by 1 foot wide for extrusion equipment. Prepare seam overlap as specified in this Section.

2. Cut four specimens, each 1.0 inch wide, from the trial seam sample. Test two specimens in shear and two in peel, using a field tensiometer. The test specimens shall not fail in the seam. If a specimen fails, repeat the entire operation. If the additional specimen fails, do not accept the seaming apparatus or seamer until the deficiencies are corrected and two consecutive successful trial seams are achieved. A seamer may start production seaming prior to testing of the trial seams. In the event the trial seam fails, all production seams by the seamer are failed seams.

I. Nondestructive Seam Continuity Testing:
   1. Nondestructively test for continuity field seams over their full length. Perform continuity testing as the seaming work progresses, not at the completion of field seaming. Complete any required repairs in accordance with this Section. Apply the following procedures:
      a. Use vacuum testing for extrusion welds.
      b. Use air pressure testing for double-track fusion seams.
   2. Vacuum Testing:
      a. Use the following equipment:
         i. A vacuum box assembly consisting of a stiff housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
         ii. A system for applying 5 pound per square inch (psi) gauge suction to the box.
         iii. A bucket of soapy solution and applicator.
      b. Follow these procedures:
         i. Energize the vacuum pump and reduce the tank pressure to 5 ±1 psi gauge.
         ii. Wet an area of the geomembrane seam larger than the vacuum box with the soapy solution.
         iii. Place the box over the wetted area.
         iv. Close the bleed valve and open the vacuum valve.
         v. Ensure that a leak tight seal is created.
         vi. Examine the geomembrane through the viewing window for the presence of soap bubbles for not less than 20 seconds.

vii. If no bubbles appear after 20 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.
viii. Mark all areas where soap bubbles appear with a marker that will not damage the geomembrane and repair in accordance with this Section.

3. Air Pressure Testing:
   a. Use the following equipment:
      i. An air pump (manual or motor driven) or air reservoir, equipped with a pressure gauge, capable of generating and sustaining a pressure between 25 and 30 pounds per square inch.
      ii. A rubber hose with fittings and connections.
      iii. A hollow needle, or other approved pressure feed device.
   b. Follow these procedures:
      i. Seal both ends of the seam to be tested.
      ii. Insert needle, or other approved pressure feed device, into the tunnel created by the fusion weld.
      iii. Insert a protective cushion between the air pump and the geomembrane.
      iv. Energize the air pump to a pressure between 25 and 30 pounds per square inches, close valve, and sustain the pressure for not less than 5 minutes.
      v. If loss of pressure exceeds 3 pounds per square inches, or does not stabilize, locate faulty area and repair in accordance with this Section.
      vi. Cut opposite end of air channel from pressure gauge and observe release of pressure to ensure air channel is not blocked.
      vii. Remove needle, or other approved pressure feed device, and seal both ends in accordance with this Section.

J. Destructive Testing:
   1. Perform destructive seam tests to evaluate seam strength and integrity. Perform destructive testing as the seaming work progresses, not at the completion of field seaming.
   2. Sampling and Testing:
      a. Collect destructive test samples at a minimum average frequency of one test location per 500 feet of seam length and at additional locations of suspected nonperformance. The CQC Consultant will select test locations, including locations with evidence of excess geomembrane crystallinity, contamination, offset seams, or any other evidence of inadequate seaming.
      b. Cut samples at the locations designated by the CQC Consultant at the time the locations are designated. Number each sample and identify the sample number and location on the panel layout drawing. Immediately repair all holes in the geomembrane resulting from the destructive seam sampling in accordance with

the repair procedures described in this Section. Test the continuity of the new seams in the repaired areas according to this Section.

c. Cut two strips 1 inch wide and 12 inch long with the seam centered parallel to the width from either side of the sample location. Test the two 1-inch wide strips in the field tensiometer in the peel mode. The CQC Consultant may request an additional test in the shear mode. If these samples pass the field test, prepare a laboratory sample at least 1 foot wide by 3.5 feet long with the seam centered lengthwise. Cut the laboratory sample into three parts and distribute as follows:
   i. One portion 1 foot long to the Installer.
   ii. One portion 1.5 feet long to the CQC Consultant for testing.
   iii. One portion 1 foot long to the Construction Manager for archival storage.

3. In the event of failing field or laboratory test results, the Contractor may reconstruct the entire seam between two passing destructive tests; otherwise, the CQC Consultant shall identify the extent of the nonconforming area following the methods given in the Construction Quality Assurance (CQA) Plan referenced in Part 9 of the Contract Documents. Obtain additional samples for testing as requested by the CQC Consultant.

K. Defects and Repairs:
1. Inspect the geomembrane before and after seaming for evidence of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection. Sweep or wash the geomembrane surface if surface contamination inhibits inspection.
2. Test each suspect location, both in seam and non-seam areas, using the methods described in this Section. Repair each location that fails nondestructive testing.
3. Cut and reseam wrinkles not conforming with this Section. Test the seams thus produced like any other seam.
4. Repair Methods:
   a. Repair any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test. Use the most appropriate of the available procedures:
      i. patching, used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter;
      ii. abrading and reseaming, used to repair small sections of extruded seams;
      iii. spot seaming, used to repair minor, localized flaws;
      iv. capping, used to repair long lengths of failed seams;
      v. topping, used to repair areas of inadequate seams, which have an exposed edge less than 4 inches in length; and

vi. removing bad seam and replacing with a strip of new material seamed into place (used with long lengths of fusion seams).

b. When making repairs, satisfy the following:
   i. abrade surfaces of the geomembrane that are to be repaired no more than 20 minutes prior to the repair;
   ii. clean and dry all geomembrane surfaces immediately prior to repair;
   iii. only use approved seaming equipment;
   iv. extend patches or caps at least 6 inches beyond the edge of the defect, and round corners of patches to a radius of at least 3 inches; and
   v. cut the geomembrane below large caps to avoid potential for water or gas collection between the two sheets.

5. Repair Verification:
   a. Test each repair using the methods described in the "Nondestructive Seam Continuity Testing" Article of this Part. Repairs that pass the nondestructive test are adequate unless the CQC Consultant elects to also perform destructive tests. Re-repair and retest failed tests.

3.03 CREST ANCHOR SYSTEM

A. Temporarily anchor each geomembrane panel in the anchor trench at the crest of the slope as soon as the panel is deployed or positioned.

B. Do not entrap soil, sand bags, or other materials between the geosynthetic layers.

C. Do not backfill the anchor trench until all geosynthetic layers are installed in the anchor trench. Do not place geomembrane in anchor trench if standing water is present. Backfill in accordance with the Construction Drawings and Section 02215.

D. Do not damage any geosynthetic layer when backfilling the anchor trench.

3.04 MATERIALS IN CONTACT WITH THE GEOMEMBRANE

A. Take all necessary precautions to prevent damage to the geomembrane and it’s texturing during the installation of other components of the liner system.

B. Do not drive equipment directly on the geomembrane. Only use equipment above the geomembrane that meets the following ground pressure requirements.

Maximum Allowable Equipment Ground Pressure (pounds per square inches)	Minimum Thickness of Overlying Material (inches)
<5	12
<10	18
<20	24
>20	36

C. Penetrations:
   1. Install the geomembrane at liner penetrations, and connect the geomembrane to penetrating pipes and the liner penetration boxes in accordance with the Construction Drawings and Section 13005. Take extreme care while seaming around appurtenances as neither nondestructive nor destructive testing may be feasible in certain areas.

3.05 CONSTRUCTION QUALITY REQUIREMENTS

A. The CQC Consultant will send geomembrane destructive seam samples to the CQC laboratory for testing to ensure that seam performance requirements are met. Performance testing and frequency shall be as given in the CQA Plan, referenced in Part 9 of the Contract Documents.

B. The CQC Consultant will monitor geomembrane installation as required by the CQA Plan.

3.06 SURVEY CONTROL

A. Survey the installed geomembrane liner in accordance with Section 02100.

TABLE 02770-1

REQUIRED HDPE TEXTURED GEOMEMBRANE PROPERTIES

Properties	Qualifiers	Units[1]	Specified Values		Test Method
			Liner	Cap	
Physical Properties					
Thickness	average	mils	80	60	GRI-GM8
	minimum	mils	76	58	GRI-GM8
Specific Gravity	minimum	N/A	0.94		ASTM D 792 Method A or ASTM D 1505
Carbon Black Content	range	%	2-3	2-3	ASTM D 1603
Carbon Black Dispersion	N/A	none	Category 1 or 2		ASTM D 5596
Mechanical Properties					
Tensile Properties (each direction)					
1. Force Per Unit Width at Yield	minimum	lb/in	168	126	ASTM D 638 (Modified by NSF 54 Annex A)
2. Tensile Strength (force per unit width at break)	minimum	lb/in	120	90	ASTM D 638 (Modified by NSF 54 Annex A)
3. Elongation at Yield	minimum	%	12	12	ASTM D 638 (Modified by NSF 54 Annex A)
4. Elongation at Break	minimum	%	100	100	ASTM D 638 (Modified by NSF 54 Annex A)
Tear Resistance	minimum	lb	56	42	ASTM D 1004 Die C Puncture

TABLE 02770-1 (continued)

Properties	Qualifiers	Units[1]	Specified Values		Test Method
			Liner	Cap	
Environmental Properties					
Low Temperature Brittleness	maximum	C	-60	-60	ASTM D 746 Procedure B
Dimensional Stability (each direction)	maximum change	%	±2	±2	ASTM D 1204 212 F, 15 min.
Notched Constant Tensile Load	minimum	hrs	500[2]	500[2]	ASTM D 5397

Notes: 1. % = percent
g = grams
min = minutes
lb/in = pounds per inch
lb = pound
C = degrees celsius
hrs = hours

2. Time-to-failure at a tensile stress of 30 percent of the tensile yield strength.
Test is conducted on smooth geomembrane from the same resin lot (batch) as the textured geomembrane furnished.

TABLE 02770-2

REQUIRED HDPE TEXTURED GEOMEMBRANE SEAM PROPERTIES

Properties	Qualifiers	Units[3]	Specified Values		Test Method
			Liner 80 mil	Cap 60 mil	
Shear Strength[1]					
fusion	minimum	lb/in	151	113	ASTM D 4437
extrusion	minimum	lb/in	151	113	ASTM D 4437
Peel Adhesion					
FTB[2]					
fusion	minimum	lb/in	115	88	ASTM D 4437
extrusion	minimum	lb/in	84	63	ASTM D 4437

Notes: 1. Also called "Bonded Seam Strength". Value is at material yield point.
2. FTB = Film Tear Bond. (Maximum 10 percent seam separation)
3. lb/in = pounds per inch

[END OF SECTION]